

JHARKHAND STATE ELECTRICITY REGULATORY COMMISSION, RANCHI
(SUO-MOTU TARIFF ORDER FOR PROCUREMENT OF POWER FROM SOLAR PV
POWER PROJECT AND SOLAR THERMAL POWER PROJECT), 2010

Case No. 13 of 2010

PRESENT
MUKHTIAR SINGH, Chairperson
T. MUNIKRISHNAIAH, Member (E)

ORDER
(12.07.2010)

In exercise of the powers vested under Section 61 read with Section 181 of the Electricity Act 2003, the Commission has notified the “Jharkhand State Electricity Regulatory Commission (Determination of tariff for procurement of power from solar PV power project and solar thermal power project) Regulations, 2010” on June 24, 2010.

The “Jharkhand State Electricity Regulatory Commission (Determination of tariff for procurement of power from solar PV power project and solar thermal power project) Regulations, 2010” provides for determination of generic tariff for solar PV power project and solar thermal power project on the basis of the norms prescribed in the said Regulations. The Commission hereby suo-motu notifies the generic tariff for solar PV power project and solar thermal power project on the basis of the norms specified in the said Regulations.

The Commission has considered applicable Income Tax rate of 33.99% for the solar PV power project and solar thermal power projects availing the benefit of accelerated depreciation. For the purpose of determining net depreciation benefits, depreciation @ 5.28% as per Straight Line Method (book depreciation as per Companies Act, 1956) has been compared with depreciation as per Income Tax rate, i.e., 80% of the written down value method and depreciation for the first year has been calculated at the rate of 40%, assuming the project capitalization during second half of the financial year. The tax benefit has been determined as per normal tax rate on the net depreciation benefit. The Commission determines per unit levellised accelerated depreciation benefit considering the weighted average cost of capital as the discounting factor.

Meanwhile, In case the generating company/ project developer opts for a project specific tariff, the Commission shall determine the tariff on the basis of the petition filed by the generating company/project developer in accordance with the financial norms as laid out in the “Jharkhand State Electricity Regulatory Commission (Determination of tariff for procurement of power from solar PV power project and solar thermal power project) Regulations, 2010”.

A1: LEVELLISED TARIFF FOR SOLAR PV POWER PROJECTS

- 1.1 The cost parameters considered by the Commission to determine tariff for power generated from solar PV power projects which shall also include Rooftop solar PV projects are summarized in the table below:

Table 1: Cost parameters considered by Commission for tariff determination

Parameters	Solar PV project
Capital cost (Rs Crores/MW)	17
Capacity Utilization Factor	19%
Auxiliary consumption	-
Useful life /Life of the machine	25 yrs
Debt: equity ratio	70:30
Loan repayment period	10 yrs
Interest on loan	13.39%
Interest on Working Capital	12.89%
O&M expenses	Rs 9 lakhs per MW with annual escalation of 5.72%
Depreciation	1 to 10 yrs – 7% 11 to 25 yrs – 1.33%
Residual value	10% of capital cost
Return on equity (pre-tax)	19% - for first 10 yrs, 24% - from 11th yr to 25 yr

- 1.2 The generic levellised tariffs determined for Solar PV power projects based on the capital cost and other norms applicable for the projects commissioned in the year 2010-11 on or after the date of notification of the “JSERC (Determination of tariff for procurement of power from solar PV power project and solar thermal power project) Regulations, 2010”, shall be applicable for such projects commissioned till June 30, 2013 and shall be valid for a tariff period of 25 years from the Commercial Operation Date (COD).

Provided that the Power Purchase Agreements in respect of the Solar PV power projects are signed on or before 31st March, 2011, the capacity covered by the Power Purchase Agreements is commissioned on or before June 30, 2013.

- 1.3 The generic levellised tariff shall be as under:

Particulars	Levellised Tariff (Rs/ kwh)	Levellised benefit of accelerated depreciation if availed (Rs/ kwh)	Net Levellised Tariff after adjustment for accelerated depreciation (Rs/kwh)
Solar PV power projects	17.96	(2.98)	14.98

A2: LEVELLISED TARIFF FOR SOLAR THERMAL POWER PROJECTS

- 2.1 The cost parameters considered by the Commission to determine tariff for power generated from solar thermal power projects are summarized in the table below:

Table 2: Cost parameters considered by Commission for tariff determination

Parameters	Solar Thermal project
Capital cost (Rs Crores/MW)	13
Capacity Utilization Factor	23%
Auxiliary consumption	10%
Useful life /Life of the machine	25 yrs
Debt: equity ratio	70:30
Loan repayment period	10 yrs
Interest on loan	13.39%
Interest on Working Capital	12.89%
O&M expenses	Rs 13 lakhs per MW with annual escalation of 5.72%
Depreciation	1 to 10 yrs – 7% 11 to 25 yrs – 1.33%
Residual value	10% of capital cost
Return on equity (pre-tax)	19% - for first 10 yrs, 24% - from 11th yr to 25 yr

- 2.2 The generic levelled tariffs determined for Solar Thermal power projects based on the capital cost and other norms applicable for the projects commissioned in the year 2010-11 on or after the date of notification of the “JSERC (Determination of tariff for procurement of power from solar PV power project and solar thermal power project) Regulations, 2010”, shall be applicable for such projects commissioned till June 30, 2013 and shall be valid for a tariff period of 25 years from the Commercial Operation Date (COD).

Provided that the Power Purchase Agreements in respect of the Solar Thermal power projects are signed on or before 31st March, 2011 and the capacity covered by the Power Purchase Agreements is commissioned on or before June 30, 2013.

- 2.3 The generic levelled tariff shall be as under:

Particulars	Levelled Tariff (Rs/kwh)	Levelled benefit of accelerated depreciation if availed (Rs/kwh)	Net Levelled Tariff after adjustment for accelerated depreciation (Rs/kwh)
Solar Thermal power projects	13.12	(2.09)	11.02

- 2.4 The detailed computations of the generic tariff have been shown as per the details given below:

- (i).Solar PV projects as Annexure-I
- (ii).Solar Thermal projects as Annexure-II

A3: SUBSIDY/INCENTIVE BY CENTRAL GOVERNMENT OR STATE GOVERNMENT

- 3.1 As per clauses 5.28, 5.29 and 5.30 of the “Jharkhand State Electricity Regulatory Commission (Determination of tariff for procurement of power from solar PV power project and solar thermal power project) Regulations, 2010, in case any Central Government or State Government notification specifically provides for any Generation Based Incentive or any other incentive over and above the tariff as determined by the Commission in this order, the same shall be factored in the tariff for power generated from such projects, which qualify for availing the incentive declared by the Central Government or State Government.

Sd/-
(T. Munikrishnaiah)
Member (E)

Sd/-
(Mukhtiar Singh)
Chairperson

Annexure-I

TARIFF DETERMINATION FOR SOLAR PHOTO VOLTAIC POWER PLANTS

Units Generation	Unit	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Aux Consumption	%		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Installed Capacity	MW		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Generation	MU		1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66

Cost of generation	Unit	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
O&M Expenses	Rs Lakh		9.00	9.51	10.06	10.63	11.24	11.89	12.57	13.28	14.04	14.85	15.70	16.59	17.54	18.55	19.61	20.73	21.92	23.17	24.49	25.90	27.38	28.94	30.60	32.35	34.20	
Depreciation	Rs Lakh		119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00
Interest on term loan	Rs Lakh		151.37	135.44	119.51	103.57	87.64	71.70	55.77	39.84	23.90	7.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Cap	Rs Lakh		0.27	0.29	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.45	0.47	0.50	0.53	0.56	0.59	0.62	0.66	0.70	0.74	0.78	0.82	0.87	0.92	0.97	1.03	
ROE	Rs Lakh		96.90	96.90	96.90	96.90	96.90	96.90	96.90	96.90	96.90	96.90	96.90	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40
Total Cost of generation	Rs Lakh		376.54	361.14	345.77	330.43	315.12	299.85	284.61	269.42	254.27	239.16	161.18	162.10	163.08	164.12	165.21	166.36	167.58	168.88	170.24	171.68	173.21	174.82	176.53	178.33	180.24	
Per unit Cost of generation	Rs/kwh		22.62	21.70	20.77	19.85	18.93	18.02	17.10	16.19	15.28	14.37	9.68	9.74	9.80	9.86	9.93	10.00	10.07	10.15	10.23	10.32	10.41	10.50	10.61	10.71	10.83	

Levellised cost of ger 17.58

Calculations showing the admissible gains of accelerated depreciation under Income Tax Act for solar PV power plants

Capital cost Rs/MW	1700																											
Discount Rate	15.97%																											
Income Tax rate@	33.99%																											
Accelerated deprecia	80%																											
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25			
Book Depreciation	2.64%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	2.88%	0	0	0	0	0	0	0	0	0	0
Depreciation-	44.88	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	89.76	48.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Depreciation	40%	48%	9.60%	1.92%	0.38%	0.08%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Depreciation-	680.00	816.00	163.20	32.64	6.53	1.31	0.26	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Depreciation difference admissible	635.12	726.24	73.44	(57.12)	(83.23)	(88.45)	(89.50)	(89.71)	(89.75)	(89.76)	(89.76)	(89.76)	(89.76)	(89.76)	(89.76)	(89.76)	(89.76)	(48.96)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Effective Income Tax	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%
Income Tax gain	215.88	246.85	24.96	(19.42)	(28.29)	(30.07)	(30.42)	(30.49)	(30.51)	(30.51)	(30.51)	(30.51)	(30.51)	(30.51)	(30.51)	(30.51)	(30.51)	(16.64)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Discount Factor	1.00	0.93	0.80	0.69	0.59	0.51	0.44	0.38	0.33	0.28	0.24	0.21	0.18	0.16	0.13	0.12	0.10	0.09	0.07	0.06								
Discounted Tax gain	215.88	228.59	19.93	(13.37)	(16.80)	(15.39)	(13.43)	(11.61)	(10.01)	(8.63)	(7.44)	(6.42)	(5.54)	(4.77)	(4.12)	(3.55)	(3.06)	(1.44)	0.00	0.00								
Levellised Income TAX gain	46.28																											
Solar generation MU	0.83	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	
Levellised	15.51																											
Levellised Income TAX benefit in	2.98																											

Annexure-II

TARIFF DETERMINATION FOR SOLAR THERMAL POWER PLANTS

Units Generation	Unit	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Aux Consumption	%		10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Installed Capacity	MW		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Generation	MU		1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81

Cost of generation	Unit	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M Expenses	Rs Lakh		13.00	13.74	14.53	15.36	16.24	17.17	18.15	19.19	20.29	21.45	22.67	23.97	25.34	26.79	28.32	29.94	31.66	33.47	35.38	37.40	39.54	41.81	44.20	46.73	49.40
Depreciation	Rs Lakh		91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00	91.00
Interest on term loan	Rs Lakh		115.76	103.57	91.39	79.20	67.02	54.83	42.65	30.46	18.28	6.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on working Capital	Rs Lakh		0.39	0.41	0.44	0.46	0.49	0.52	0.55	0.58	0.61	0.65	0.68	0.72	0.76	0.81	0.85	0.90	0.95	1.01	1.06	1.13	1.19	1.26	1.33	1.41	1.49
ROE	Rs Lakh		74.10	74.10	74.10	74.10	74.10	74.10	74.10	74.10	74.10	74.10	93.60	93.60	93.60	93.60	93.60	93.60	93.60	93.60	93.60	93.60	93.60	93.60	93.60	93.60	93.60
Total Cost of generation	Rs Lakh		294.25	282.83	271.45	260.12	248.84	237.62	226.44	215.33	204.27	193.28	184.25	175.58	167.99	161.49	155.07	148.73	143.50	138.36	134.34	130.42	126.60	122.95	119.46	116.12	112.92
Per unit Cost of generation	Rs/kwh		16.23	15.60	14.97	14.35	13.72	13.10	12.49	11.87	11.27	10.66	10.06	9.46	8.87	8.29	7.72	7.17	6.63	6.10	5.58	5.07	4.57	4.08	3.60	3.13	2.68

Levillised cost of generation (Rs/kwh) (25 yrs) 12.84

Calculations showing the admissible gains of accelerated depreciation under Income Tax Act for solar thermal plants

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Capital cost Rs/MW	1300																									
Discount Rate	15.97%																									
Income Tax rate	33.99%																									
Accelerated	80%																									
Book Depreciation	2.64%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	2.88%	0	0	0	0	0	0	0	0	0
Depreciation-	34.32	68.64	68.64	68.64	68.64	68.64	68.64	68.64	68.64	68.64	68.64	68.64	68.64	68.64	68.64	68.64	37.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Depreciation	40%	48%	9.60%	1.92%	0.38%	0.08%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Depreciation-	520.00	624.00	124.80	24.96	4.99	1.00	0.20	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Depreciation difference admissible	485.68	555.36	56.16	(43.68)	(63.65)	(67.64)	(68.44)	(68.60)	(68.63)	(68.64)	(68.64)	(68.64)	(68.64)	(68.64)	(68.64)	(68.64)	(37.44)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Effective Income Tax	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%	33.99%
Income Tax gain	165.08	188.77	19.09	(14.85)	(21.63)	(22.99)	(23.26)	(23.32)	(23.33)	(23.33)	(23.33)	(23.33)	(23.33)	(23.33)	(23.33)	(23.33)	(12.73)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Discount Factor	1.00	0.93	0.80	0.69	0.59	0.51	0.44	0.38	0.33	0.28	0.24	0.21	0.18	0.16	0.13	0.12	0.10	0.09	0.07	0.06						
Discounted Tax gain	165.08	174.81	15.24	(10.22)	(12.84)	(11.77)	(10.27)	(8.87)	(7.66)	(6.60)	(5.69)	(4.91)	(4.23)	(3.65)	(3.15)	(2.71)	(2.34)	(1.10)	0.00	0.00						
Levillised Income TAX gain	35.39																									
Solar generation MU	0.91	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	
Levillised	16.89																									
Levillised Income TAX benefit in	2.09																									